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Priming the Energy Pump in Hawaii

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Support of Local Energy Businesses . . .

and more



Ray Starling
President

OFF-PEAK / ELITE ENERGY GROUP, LLC
Hawaii's Ice Thermal Storage Experts

OFF-PEAK / ELITE ENERGY GROUP, LLC is a small energy business in Hawaii that designs, builds and operates ice thermal storage systems for commercial air conditioning. We have installed and now operate three full ice systems in Honolulu, Maryknoll High School, Aiea Medical Building and Market City Shopping Center. We have another full ice system under construction at Mid-Pacific Institute scheduled for completion in December 2000.

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ENERGY FACTS FOR HAWAII

- Hawaii is too dependent on imported oil
- Oil and electric energy costs continue to go up
- HE has to build new G&T facilities to meet "peak" loads
- A/C load is major component of HE daytime "peak"
- HE has significant idle G&T capacity at nighttime
- HE system is far more efficient at night than in day
- Better HE system efficiency = less cost for everyone
- A more efficient HE system is kinder to the earth

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These are some of the basic Energy Facts that we live with in Hawaii. These Facts not only describe the fundamental energy problems that we face, but also give a hint at where to look for solutions to those problems.

- Hawaii is much too dependent on imported oil.
- Oil and electric energy costs continue to go up at alarming rates.
- Hawaiian Electric companies in the islands have to build new generation and transmission facilities to meet "peak" loads.
- Peak electric loads usually occur during the day as a result of air conditioning loads.
- Hawaiian Electric companies have significant idle generation and transmission capacity at

nighttime (i.e., 1200MW daytime vs. 400MW nighttime at HECO).

- The Hawaiian Electric system efficiency is far more efficient at nighttime than in daytime due to availability of the most efficient equipment on the HE system.
- Better Hawaiian Electric efficiency results in lower electric cost for everyone using electricity on the HE system.
- A more efficient HE system is also much kinder to the earth, with less fossil fuel use, lower air emissions and less greenhouse gases.

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UNTAPPED ENERGY OPPORTUNITIES

- Shifting HE peak load to off-peak increases efficiency
- Ice thermal storage acts like a “thermal battery”
- Ice thermal storage can shift large HE loads to off-peak
- Enormous benefit if large A/C loads shifted in Hawaii

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Anytime an electric load can be shifted from on-peak to off-peak, our energy problems are reduced, HECO’s entire system efficiency is improved, fossil fuel use is reduced, air pollution is reduced, global warming is slowed, the need for new generators and transmission lines is reduced and the cost of electricity for everyone on the HE system is reduced.

Ice thermal storage has a unique ability to shift very large electric loads from on-peak to off-peak times. By using the “battery” effect of ice storage, we can make and store ice at night (when generation costs are *low* and system efficiencies are *high*) and use that ice for cooling during the day (when generation

costs are *high* and system efficiencies are *low*).

Because ice thermal storage in Hawaii is almost non-existent, this leaves a vast untapped opportunity to shift electric load, save wasted energy and reduce energy costs.

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CURRENT STATUS OF ICE STORAGE IN HAWAII

- Three existing full ice storage plants in Hawaii
- Four partial ice storage plants in Hawaii

BUT . . .

- Only two engineering firms in Hawaii have ever done ice
- Only one mechanical contractor has ever done full ice
- Still missing significant opportunities to install ice storage

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There are only 7 ice thermal storage facilities operating in all of Hawaii, with 6 of them built in the last 4 years.

Only two engineering firms in Hawaii have ever attempted to design an ice system and only one Hawaii mechanical contractor has ever constructed a full ice system.

More importantly, because of ignorance, fear and short-sightedness, many new conventional air conditioning systems are being installed each day in Hawaii without any serious consideration of ice thermal storage as an alternative.

As a practical matter, once a new conventional system is installed, that new electric load will be a burden on the ECO’s system “peak” for the next 20-25 years, costing us all. By comparison, ice thermal storage takes this burden off the electric system for the next 20-25 years.

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WHY CONTINUED PRIMING IS NEEDED ?

- Hawaii is far behind in shifting electric loads with ice thermal storage
- Uncertain economy still causes short-sighted decisions
- “First cost” usually wins over life cycle (operating) costs
- New energy ideas difficult to sell in Hawaii
- “Critical mass” acceptance is required to ensure the success of ice
- Small energy businesses are losing talent to mainland
- Big energy firms have locked up prime government contracts

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Because ignorance, fear and shortsightedness are still keeping Hawaii from enjoying the many benefits of ice thermal storage, continued priming of energy pump is needed, at least until ice gains more widespread acceptance.

The rest of the world is much farther along than Hawaii in its use of ice thermal storage. Pictures at the end of this slide series will show what the rest of the world is doing with ice storage technology.

Hawaii’s uncertain economy still causes short-sighted decisions when building owners are faced with large investments for capital equipment. The

higher “first cost” of ice thermal storage systems compared with conventional A/C systems leads many building owners to choose the less expensive conventional system, when the ice system would save much

more in energy costs over its life than the conventional system. In fact, the ice storage system will actually save enough from electric load shifting over its life to pay for itself; the conventional system will never save anything from load shifting.



Additionally, new energy ideas like ice thermal storage are difficult to sell in Hawaii. In particular, design engineers and architects have a built in bias towards the conventional A/C systems that they are used to and understand. They are generally not willing to take a chance on a new technology. The fact that ice thermal storage is practically non-existent in Hawaii is testament to this reluctance.

In order for ice storage to become successful, a certain “critical mass” of acceptance is necessary. Continued priming of the energy pump is absolutely essential to achieving that critical mass of acceptance. Small energy firms have lost talent to the mainland because energy conservation efforts in Hawaii have diminished in the difficult economy of the 90s. Big energy firms have locked up prime government contracts, leaving nothing for small energy firms.

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WHAT KIND OF CONTINUED PRIMING IS NEEDED ?

- Continued energy tax credit on ice storage systems
 - Encourages the short-sighted and weak-hearted
 - Brings payback period into range of acceptability
 - Helps move ice storage toward sustainable “critical mass”
- Continued feasibility study support by HE
 - Helps ensure systems are sized right and are successful
- Continued equipment rebate support from HE
 - Helps defray equipment cost

Existing energy pump priming has been very helpful in getting ice thermal storage started in Hawaii, but this needs to continue until a time when ice thermal storage has gained a sustainable “critical mass”.

Energy tax credits make the additional capital cost of ice thermal storage systems tolerable when compared to conventional systems. Payback periods are brought within the range of acceptability when compared to conventional systems. This has encouraged the first adventurers to give ice a try. It is essential that these tax credits remain in place until ice gains more widespread use in Hawaii.



Feasibility studies conducted before installation of ice systems are essential to proper system design and sizing. HE support for feasibility studies has insured that detailed analysis is accomplished. This has led to a very good record of adequate design of ice systems in Hawaii. This program also needs to be continued until the design/engineering of ice storage systems is second nature for design professionals.

Likewise, equipment rebates are essential to encouraging initial use of ice thermal storage, before general acceptance is obtained. This program should be continued.

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WHAT KIND OF NEW PRIMING IS NEEDED ?

- New emergency electric rates (in case sufficient ice is not made)
 - Needed to ensure reliability without excessive redundancy
- New “shoulder” electric rates (between on and off-peak periods)
 - Needed to reduce ice system size
- Policy encouraging *government* use of ice storage
 - Pilot project (school) or required consideration for new installations
 - Needed to set stronger example for private entities

Three kinds of NEW priming would help the cause of ice thermal storage:

1. New emergency electric rates are needed to avoid excessive (and expensive) redundancy. These rates would allow for running of off-peak ice chillers during peak periods without unreasonable penalty if sufficient ice was not made during the off-peak ice-making period due to equipment problems.

2. New shoulder electric rates (medium cost rates between off and on-peak) would greatly reduce the size and expense of equipment needed to most effectively shift electric load.

3. Finally, policies encouraging government use of ice storage would be very helpful in setting a good public example of support for this “earth friendly” technology.

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THE FUTURE FOR HAWAII – Two possibilities :

ENERGY PUMP PRIMING SUCCEEDS

- Less power plants and T-lines
- Less fossil fuel use
- Less pollution
- Power surplus on peak
- Small energy firms thrive
- Small business contributes

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ENERGY PUMP PRIMING FAILS

- More generators and lines
- More NIMBY fights
- More dependence on oil
- More greenhouse gases
- Electric shortages on peak
- Small energy firms suffer
- Small business dies

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The future of Hawaii's energy policy can take two radically different paths, one leading to a successful priming of the energy pump and the other leading to a failure to adequately prime the energy pump.

Each path has dramatically different results as shown, making this a very important issue for Hawaii. Which results do you want to see?